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Sustainable campus of Claris lifesciences through green initiatives

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ABSTRACT

Aim: Acknowledging the imperative need of entrenching sustainability at manufacturing sites for economic and social development simultaneously with environmental protection, this paper aims at exhibiting the green initiatives taken by Claris Lifesciences Ltd.; a pharmaceutical company with a worldwide presence; with an aim to contribute to developing a sustainable campus.
Scope: Abellon Cleanenergy has taken up sustainability study of manufacturing site of Claris Lifesciences Ltd. Designing *Claris* campus, bearing in mind several sustainable parameters and making it an absolute sustainable campus. The co-generation plant uses biomass, cultivated in the same campus for combined steam and power generation to be used for the processes and operations of the manufacturing plant. To avoid the exposure of the chemical effluents coming out of plant to soil or environment, an effluent treatment plant (ETP) is installed in the campus to treat the water up in order to free the water of harmful contaminants that pollute the receiving environment. Kitchen waste is utilized in the biogas plant to produce fuel while the slurry is used as fertilizer for plantation. Wind tunnels concentrate wind for natural cooling of the campus. The building sections in the campus are equipped with natural lighting and ventilation through sky domes and turbo ventilators and HVAC. The campus takes pride in claiming to be a green with approx. 70% of the area devoted to plantation and lawns.
Conclusion: The campus is designed to support the usage of natural capital in the best possible way thereby reducing the carbon emissions and recycling and reusing certain byproducts so as to contribute to a green sustainable campus. In addition to cleaner technologies, Claris has access to monetary incentives by way of revenue generation from trading of carbon credits. It shall be a great reason for IRR boost and pave ways for obtaining conventional financing.

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1. Introduction

When one thinks of the world as a system over space, one grows to understand that air pollution from North America affects air quality in Asia, and that pesticides sprayed in Argentina could harm feed stocks off the coast of Australia. And when one thinks of the world as a system over time, one starts to realize that the decisions our grandparents made about how to farm the land continue to affect agricultural practices today; and the economic policies we endorse today would have an impact on urban poverty of the future generation.

The concept of sustainable development is rooted in this sort of system oriented thinking. It helps us understand ourselves and the world we live in. The problems we face are complex and serious—and we cannot address them in the same way we created them. But we *can* address them. Sustainable development has been defined in many ways, but the most frequently quoted definition is—"economic and social development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Sustainability makes sense for both the aspects of environment and business [1]. Business strategies for sustainable development aims to seek win–win situations which can achieve environmental quality, increase wealth, and enhance competitive advantage. It is not just a case of making expensive investments—perhaps the biggest leap that exponents of sustainable working should make is to understand that, in the short term, the biggest savings are made by doing less, not more. In an age of fluctuating energy prices and long-term uncertainty, those with robust sustainability strategies would benefit most. Companies integrate sustainable development into their business strategies through sustainable procurement, manufacturing and production. In the pursuit of economic, environmental and community benefits, long-term interests and needs of the stakeholders are considered [2].

The workplace is often an energy-inefficient environment where consumables are thoughtlessly wasted or discarded. Saving energy helps cut costs, along with improving your bottom line and also contributes to reducing demand for energy and materials. No amount of gadgets, be they wind-up, solar-powered or low-energy, can equate to a simple strategy for cutting down on paper, toner, waste and other consumables.

A sustainable campus is an outcome of a design which focuses on increasing the efficiency of resource use – energy, water, and other resources – while reducing negative impacts on human health and the environment during the building's lifecycle, through better sitting, design, construction, operation, maintenance, and removal [3]. Sustainable Campuses are designed to reduce overall impact of the built environment on human health and the natural environment by

- Efficiently using energy, water, and other resources.
- Protecting occupant health and improving employee productivity.
- Reducing waste, pollution and environmental degradation.

Any campus whose design is dictated by intrinsic sustainability can sustain itself for very long [4]. Energy efficiency and environmental preservation have long been an important part of Claris's mission and the green factory of Claris is an initiative towards the same. Claris's manufacturing plant spans across 322,226 m^2 of manufacturing space for producing pharmaceutical products including high end injectibles for treatment of critical illness and diseases. The factory has been designed and built using environmental conservation measures and it provides a healthy and safe workplace for employees.

With the construction of the campus, Claris demonstrates its vision for a better tomorrow. The state-of-the-art green campus of Claris, is the first of its kind to be undertaken by any pharmaceutical company in the state of Gujarat, India and probably in the world. It incorporates eco-friendly energy generation and energy saving practices along with efficient waste management systems. The green factory endeavors for harmony with nature and the local community. Various energy-conserving techniques incorporated in the building design reduce energy consumption and carbon emissions in path breaking ways. Dedicated to a greener world and a better tomorrow, Claris establishes a new benchmark for preserving the environment.

2. Description of the study area

The study is focussed on the manufacturing site of Claris Lifesciences Ltd., a multinational pharmaceutical company, which sets new benchmarks in green and sustainable development. It spans extensively across 322,256 m^2 of manufacturing space for producing pharmaceutical products including high end injectibles for treatment of critical illness and diseases. Inspired by the company's philosophy of investing in world class manufacturing infrastructure and technology, it has established five state-of-the-art manufacturing facilities instituted in an area of 80 acres (Fig. 1). The campus is designed by leading global architects, engineers and designers and takes pride in claiming itself as 70% carbon neutral. The company has been honored with several IDMA Quality Excellence Awards and the prestigious Frost & Sullivan Manufacturing Excellence Award for its incredibly well constructed edifice.

Fig. 1. Aerial view of Claris campus.

The entire campus area is divided into three major parts; the green belt area which constitutes around 46% of the campus accounting for 1,49,120 m^2 (Table 1), the built up area forming 31% of the campus accounting for 98,670 m^2 (Table 2) and rest of the area of 74,466 m^2 accounts for road, parking and other areas. Details of all the individual segment areas are mentioned in their respective tables (Tables 1–3).

3. Initiatives towards a green and sustainable campus

3.1. Bio mass based co-generation power plant

Considering the energy crisis faced by the country and ever increasing energy demand, co-generation systems have proven to be a very useful tool to combat the increasing energy demand [5].

Table 1
Green belt area.

Plant	Open area (m^2)	Developed area (m^2)	Under development (m^2)
Main landscape	61,300	61,300	
Manufacturing plants	67,570	33,920	33,650
Bus parking side	4250	4250	
Animal house side	400	400	
Total back side area	12,000		12,000
Central warehouse side	1500		1500
Central F.G. side	2100	2100	
Total	149,120	1,01,970	47,150

Table 2
Total built up area.

sr. no.	Plant	Open area (m^2)	Developed area (m^2)	Under development (m^2)
1	Injectable plant	13,600	13,600	
2	Administration office	1500	1500	
3	Infusion plant	24,250	24,250	
4	Other manufacturing plants	37,100	37,100	
5	Plastic division	1720	1720	
6	Animal house	400	400	
7	Central finished good	9600		9600
8	Power plant	3300	3300	
9	Utilities	1500	1500	
10	ETP	700	700	
11	Central warehousing	5000		5000
Total		98,670	84,070	14,600

Table 3
Other area.

Sr. no.	Plant	Open area (m^2)	Developed area (m^2)	Under development (m^2)
1	Road and parking	49,020	45,220	3800
2	Others	25,446	25,446	0
Total		74,446	70,666	3800

Through the simultaneous production of power/electricity, hot water, and/or steam from one fuel, cogeneration plants can reach system efficiencies exceeding 60% depending upon the type of applications.

Claris has installed a captive cogeneration power plant which runs on biomass and hence saves use of coal or lignite which are green house gas emitters. The biomass based cogeneration plant is an absolute energy-efficient and environment-friendly method of producing electricity (power) and steam for process and utility, thereby fulfilling on-site energy requirements with one fuel. The fuel used in cogeneration power plant includes bio-mass which is currently processed through castor de-oiled cakes (DOC), saw dust and bagasse.

The technology used in generation of power from biomass is similar to that of a thermal plant based on coal, except for the boiler. The cycle used is the conventional ranking cycle which burns the biomass in a high pressure boiler to generate steam with the help of which a turbine is operated. The cycle has the efficiency to generate 23–25% of net power. The exhaust of the steam turbine is used to to fulfill process steam requirements and partly to produce power.

Considering the fact that typical power plants waste up to 75% of the original fuel through heat loss, line transmission losses and other inefficiencies, Claris on other hand, has gone ahead with cogeneration plant which has the potential not only to 'capture' the wasted heat energy that would have been lost but also to triple the energy efficiencies of ordinary power plants. Furthermore, the biomass co-generation plant at Claris substantially cuts carbon dioxide emissions (and other greenhouse gases) and nitrogen oxides (NO_x) and is absolutely environment friendly. While, biomass can cut CO_2 emissions by up to 70% vs. a coal plant when utilized in a cogeneration plant, nearly 100% cuts in SO_x are possible.

The main objective of the biomass cogeneration plant at Claris is to promote the technologies that can use the country's biomass resources optimally for grid and off grid power generation. Considering the total electricity requirement of Claris campus, about 40–45% of the requirement is fulfilled by the biomass based cogen plant and the rest of the load is supported by Gujarat Electricity Board (GEB) grid. The figures for process steam consumption indicate that the per day steam requirement for process is 365 t which is 100% fulfilled by the co-gen plant.

The biomass based cogeneration plant at Claris is a part of the Clean Development Mechanism (CDM) Project which results in net reduction of GHG emissions due to utilization of biomass residue which is carbon neutral. This project is currently registered with the UNFCCC and it claims CO_2 emission reduction to the tune of 40000 t per year. Table 4 shows power plant capacity, the steam utilization for process and power and the emission reductions in terms of tons of CO_2 per year.

In addition to the fulfillment of power and steam requirements, there are certain other focus areas related to the cogen plant which contribute to the sustainability aspect of the Claris campus.

- Fly Ash Utilization: the fly ash removed from the Power plant is used in making bricks at the campus. The compressive strength,

Table 4
Details of the co-generation plant at Claris.

Capacity in MW	2
Process steam generation in TPH	10
Steam for generating electricity in TPH	6
Electricity generated from steam in KWh	6,336,000
Emission reduction in terms of CO_2, ton/year	40,000

water absorption, density and durability of these bricks are sufficient for their use in low cost housing development [6].

- Agro Waste Residue: agro waste in the form of leaves, lawn grass, pruning waste, dry bamboo leaves collected from the campus are used for firing in Co-gen plant.

3.2. Effective waste management

One of the major problems faced by the world today is the environmental protection cost and return [7]. The current practice of pollution control, treatment and environmental protection can be considered very expensive where people consider it a burden for development. There is a worldwide misconception that “environmental protection comes at the expense of economic development or vice versa”. This is not the case if environment protection is achieved by sustainable development. Sustainable development promotes economic growth given that this growth does not compromise the management of the environmental resources. The traditional approach for clinical waste, agricultural waste, industrial and municipal solid waste, etc. can be considered disastrous worldwide because it is depleting the natural resources and may pollute the environment if it is not treated/disposed of properly.

The current growing awareness of the detrimental environmental effects of current and past waste disposal methods has resulted in emphasis on this accountability by effective waste management [8]. Claris has better practices followed on current disposal methods such as chemical and effluent treatment as well as recycling and reuse.

3.2.1. Effluent Treatment Plant (ETP)

The water discharge from the manufacturing units should be treated up to certain minimum levels in order to get rid of harmful contaminants that pollute the receiving environment [9]. To ensure treatment of waste water and recycling for greening the landscape, Claris has installed membrane filtration technology as an effluent treatment plant in order to recover useful chemicals and re-use water for plantation.

3.2.2. Zero discharge concept

There is great potential for both improving efficiency and moving towards sustainability in the industrial sector [10]. Claris has tried to make sure that no waste water is discharged into rivers and hence after treatment at the ETP as well as blow down water from power plant are used for gardening as well as farming purpose.

3.2.3. Kitchen waste based bio-gas plant

In developing countries like India, the influence of western ‘throw away’ culture results in increased solid waste generation, leading not only to environmental degradation but also a huge loss of natural resources. Improper disposal of this waste leads to the spread of communicable diseases, causes obnoxious conditions and spoils the biosphere as a whole. On the other hand, cleanliness is another factor that influences the development of the nation that is otherwise hampered owing to improper disposal of solid waste. Biogas plants help generate alternate energy with highly nutrient bio-manure from this solid waste material [11]. We at Clarion, thus have instituted a mechanism to harvest biomass from un-utilized solid waste as an integrated solution for this multifaceted problem of solid waste disposal. The production of methane via anaerobic digestion of kitchen waste and food left overs has benefited the company by providing a clean fuel from renewable feed stocks. This further aids in reducing the use of fossil-fuel derived energy and reduce environmental impact. Biogas comprises approximately 45% carbon dioxide and 55% methane as well as small quantities of various gases and gives a high calorific value of 4700 kcal/m3.

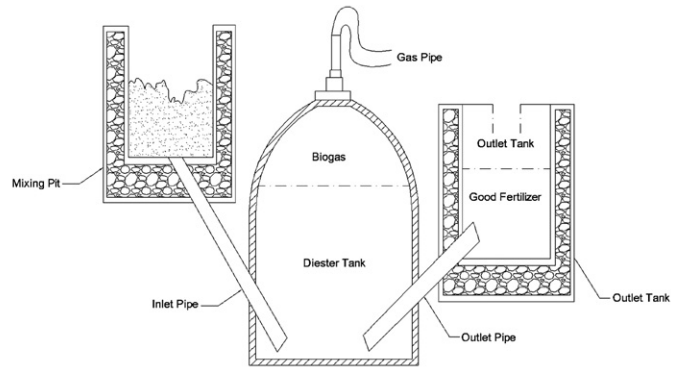

Fig. 2. Schematic diagram of a biogas plant.

As a process, the kitchen waste is fed to the biogas digester manually. The process of anaerobic digestion takes place in the digester, as a result of which the organic matter gets stabilized and biogas is generated. Once this happens, the digester is fed with food left overs and other kitchen solid waste material at regular intervals, which then aids in continuous generation of biogas thereafter. Biogas slurry obtained from the biogas plant is rich in essential nutrients, enhances water holding capacity elevates soil aeration, improves soil texture and inhibits weed seed germination. Hence, the slurry collected from the digestor which acts as an organic fertilizer or farm manure for the campus. The entire process of biogas generation from kitchen waste is diagrammatically shown in Fig. 2.

At Claris, the biogas generated is used currently for cooking and pre-heating purposes. The biogas generation at Claris has led us to achieve the following:

- Complete return from the reusable.
- Control over pollution caused by the decomposition of waste.
- Control over methane gas emissions and hence over expenses to mitigate GHG emissions (1 t of methane is equivalent to 21 t of carbon dioxide).
- Rich energy generation in terms of methane.
- Production of manure, an alternative source of energy, can be used for agriculture at no extra cost while safeguarding the depleting fossil fuel.

3.3. Landscaping

Approximately 46% of total area of Claris campus is devoted to green belt development which enhances the flow of fresh air within campus and maintaining a constant temperature. This plays an important role in creating dust free environment and contributing to carbon reduction. This is achieved by implementation of excessive tree plantation, bamboo forestation and cultivation of biomass.

3.3.1. Extensive tree plantation

Claris has built a green belt bearing in mind that it contributes to building a sustainable campus to a very large extent for a variety of reasons. Since carbon dioxide is one of the most common greenhouse gases, planting trees can help put the brakes on the greenhouse effect. One mature tree absorbs approximately 22 kilos (or 48 pounds) of carbon dioxide each year [12].So when the trees at Claris have matured, they would soak up approximately 1,010,000 kilos (or 2,400,000 pounds) of carbon dioxide annually.

In addition to that, the extensive tree plantation aid in improving the air quality by producing oxygen, cleaning up the soil and surrounding groundwater and increasing the esthetic value of the campus.

3.3.2. Bamboo sustainability

Dense peripheral Bamboo plantation has been done at Claris, for a number of reasons. Bamboo produces greater biomass and 30% more oxygen than a hardwood forest on the same area. It plays an important role in improving watersheds, preventing erosion, restoring soil, providing sweet edible shoots and removing toxins from contaminated soil [13]. It also helps reduce carbon dioxide gases blamed for global warming. Some bamboo sequesters up to 12 t of carbon dioxide per hectare, which makes it an efficient replenisher of fresh air.

Additionally, bamboo is a natural water control barrier. Because of its wide spread root system and large canopy, bamboo greatly reduces rain runoff, prevents massive soil erosion and keeps twice as much water in the watershed. Bamboo also helps mitigate water pollution due to its high nitrogen consumption, thus providing an ideal solution for excess nutrient uptake of waste water from manufacturing, livestock farming and sewage treatment. Claris has around 100 bamboo trees which helps to reduce tons of carbon dioxide.

3.3.3. Cultivation of biomass & specific plant species

The historical importance of utilization of biomass energy and biomass-related carbon release through anthropogenic activities are increasingly being recognized. Given the fundamental role that biomass has played throughout human history, biomass-related activities are bound to have caused important environmental effects, at both micro and macro levels [14].

Biomass is a carbon neutral renewable energy resource. It does not add carbon dioxide to the atmosphere as it absorbs the same amount of carbon in growing as it releases when consumed as a fuel. Its advantage also lies in the fact that it can be used to generate electricity with the same equipment or power plants that are now burning fossil fuels. Biomass is an important source of energy and the most important fuel worldwide after coal, oil and natural gas [15].

Biomass energy is gaining significance as a source of power generation and producing clean heat for domestic heating and community heating applications. Half a kilo of dry plant tissue can produce as much as 1890 KCal of heat which is equivalent to the heat available from a quarter of kilogram of coal.

Claris has made significant efforts to cultivate biomass producing plant species which serve as feedstock to the cogeneration power plant. In addition to that, it also cultivated some other species which help us in production of liquid biofuels such as biodiesel and ethanol. The details of the different plant species cultivated at Claris with the specific purpose and population is mentioned in the Table 5.

3.3.4. Ambient air quality measurement

Since Claris Campus runs on 70% green energy, it has achieved significantly low levels of air pollutants beyond compliance. Wind tunnels have been designed to concentrate wind for natural cooling of the campus and to aid chimney discharge in the appropriate direction so as to avoid its harmful effect on the campus occupants (Fig. 3). The ambient air quality measurements are shown in Table 6.

3.3.5. Solid waste management

Claris has deployed various methods for solid waste management. These are

- Wastes used as raw materials: the scraps from the plastic bottles used in the manufacturing plants are cleaned, processed and then reused.
- Dry waste accumulation: dry paper, metal and plastic waste is accumulated in special bags and is sold to recycling industries for further recycling process.

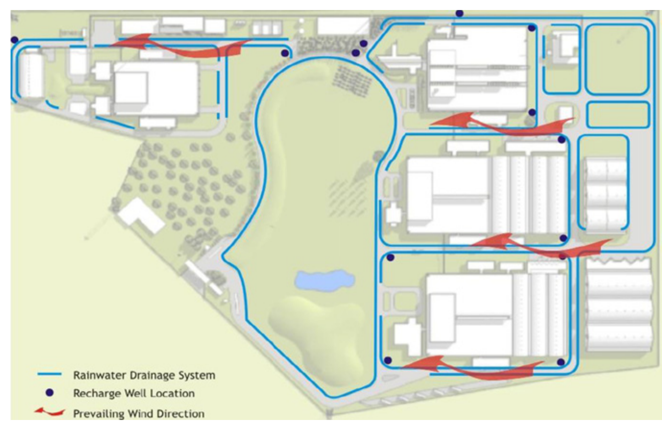

Fig. 3. Water management and wind flow within the Claris campus.

Table 6
Ambient air quality measurements.

Parameter	Permissible limit	Present value
Suspended particulate matter	500 micrograms/m^3	96.7 micrograms/m^3
Sulfur dioxide	120 micrograms/m^3	12.67 micrograms/m^3
Carbon monoxide	10 micrograms/m^3	2 micrograms/m^3
Nitrogen dioxide	120 micrograms/m^3	15.83 micrograms/m^3

Table 5
Details of different plant species at Claris.

Sr. no.	Name of crop	Plant population/acre	Distance of species	Purpose
1	Bamboo	2600	1 × 1.5	Good for esthetic point of view and CO_2 emission reduction
2	Ipomea	4000	1 × 1	For solid biofuel
3	Sweet sorghum	60,000	0.45 × 0.15	For ethanol and solid biofuel
4	Sunflower	60,000	0.45 × 0.15	For biodiesel and solid biofuel
5	Sunhemp	60,000	0.45 × 0.15	For solid fuel (fix nitrogen in soil)
6	Sessbenia	2600	1 × 1.5	For solid fuel (fix nitrogen in soil)
7	Lawn	NA	NA	Co-combustion
8	Elephant grass	8000	1 × 0.5	For solid biofuel
9	Jatropha	1000	2 × 2	For biodiesel and solid biofuel

3.3.6. Soil conservation

At Claris, contours have been developed from excavated earth within the campus in order to achieve the following:

- Providing an unfolding view to the campus.
- Enhancing esthetic beauty.
- Maintaining homogeneity of the mother soil.
- Maintaining artificial flow of the wind.
- Lower mortality ratio of plants.

3.3.7. Efficient water resource management

Efficient water management systems ensure optimal utilization of this precious resource. Claris has the following to achieve efficient water resource management Table 7:

1. Rain water harvesting system & recharge wells: water harvesting is the activity of direct collection of rainwater, which can be stored for direct use or can be recharged into the groundwater. Water harvesting is the collection of runoff rain water for productive purposes [16]. In an area of 2,400 ft^2 or 223 m^2. (40 ft $\times$ 60 ft site) around 2,23,000 l of rainwater can be harvested. The amount of rainwater that can be harvested depends on the catchment area, rainfall in that area and collection efficiency etc. In order to avoid rain water to drain away, Claris has a rainwater harvesting system, 13 recharge wells and a well-designed storm water drainage channel system to preserve ground water and maintain the water level. Fig. 3 shows water management and wind flow in the campus. NIIT University campus in Rajasthan state of India has followed the similar concept of water conservation [2].
2. Borewells & Raw water storage tanks: there are no large water bodies available near the Claris campus and at the same time there is no other source of external supply. Thus, there is no option but to extract water from ground.

Table 7
Cost benefits from efficient water management.

Total extraction from bore wells	476 m^3/day
Total plant needs	476 m^3/day
Area under landscaping	48,000m^2
Total rejection water	263 m^3/day
Treated water/m^2 of lawn	5.48 ltrs/m^2
Saving in operating costs	INR. 24879/day
Total monthly savings	INR. 74637.03

Table 8
Carbon neutrality in Claris.

Campus carbon footprint	
Gujarat Electricity Board (GEB)	
GEB units consumption per day	45,000
GEB units consumption per year	1,64,25,000
Grind Emission factor (kg of CO_2/unit)	0.86
Total CO_2 emission, Ton/year	**14126**
Biomass based Co generation power plant	
Capacity in MW (Thermal)	14
Process steam generation from renewable source in TPH	16
Energy generated in TJ	395
Emission reduction in terms of CO_2, Ton/year	**40,000**
Biomass	
Biomass production, tons/year	4000
Total steam generated tons/annum	22,000
Enthalpy produced TJ	72.16
Emission factor of lignite (ton carbon/ TJ)	27.6
Emission reduction in terms of CO_2, Ton/year	**7302**
Bamboo Forestation	
Tons carbon capture per hector	8
Total area of Bamboo plantation (m^2)	5000
Total emission reduction (ton/year)	4

At Claris, all the bore wells are interconnected and the borewell water passes through the centralized pressure sand filters located near the utility house which states that all available raw water for the campus has SDI lesser than 5.

At present there are two raw water storage tanks each having a capacity of 75,000 l which supply water to the manufacturing units at Claris and also serves as service water. Service water means water used for housekeeping, washing, land scaping and any miscellaneous activity other than specified.

3.3.8. Natural lighting and ventilation

In general, there are four basic reasons why natural lighting systems are required by building codes in many parts of the world. The reasons are: (1) to facilitate the performance of visual tasks and ensure visual comfort; (2) to provide visual communication channels between people and their outdoor environment; (3) to provide psychological impact to lighting schemes; and (4) to conserve lighting energy, during daylight hours, and help reduce the total energy requirements in buildings [2].

Claris has introduced natural lighting in all the buildings. It has installed around 1708 sky domes over the ceiling area which help in utilizing the natural light during day time and reduces the lighting load. The skydomes are installed where they remain exposed to direct sun throughout most of the day. A great amount of attention has been paid while installing them so they face the sun as much as possible, in order to keep skydomes as small as possible.

Sky domes have proved to be significantly effective for manufacturing and maintenance operations at the campus. Fully glazed glass panes and partitions provide better visibility and transparency of operations. It has helped reduce the lighting loads and possibility of accidents.

In addition to sky domes Claris has installed 88 variable frequency drives (VFDs) in order to increase energy efficiency. High Ventilation Air Conditioning (HVAC) & Natural Turbo Ventilation are installed at manufacturing units for even cooling and saving energy.

It is well known that natural light harvesting saves electricity and reduces carbon emission by 36,800 Lb every year whereas turbo ventilation saves electricity and saves 55,200 Lb carbon emission every year.

4. Results

The green initiatives taken by Claris LifeSciences has led to achieve significantly remarkable results to transform it to an emerging sustainable campus. The various milestones achieved are highlighted in Table 8:

1. A Manufacturing campus which is
   - 70% " Carbon Neutral"
   - 40% green in terms of electricity consumption
   - 100% green in terms of thermal energy (steam).
2. Several initiatives targeted and achieved 70,036 t of carbon excess by 2010.
3. A Carbon positive campus which leads to increase in human and process productivity.

Table 9
Potential contribution to global warming and present status of emission reductions.

Potential contribution to Global warming	Present status of emission reduction	
Through thermal energy 28,000 t CO_2 e p.a.	Thermal energy	Nil (90–100% green in thermal energy)
Through electrical energy 15,460 t CO_2 e p.a.	Electrical energy	8000–9000 t of CO_2 (40–45% green in electrical energy)
Total contribution to CO_2 increase 43,000–44,000 t CO_2 e p.a.	Campus runs on 70% clean energy	

4. One of the few companies to install 2 Mega Watt biomass based Co-gen plant to meet captive power requirements and receive CDM approvals.
5. Received CDM approval from UNFCCC for "Abatement of GHG emissions through biomass residue based co-generation at Claris", claiming CO_2 emission reduction t up to 40,000 t per year Table 9.

5. Conclusions

The green initiatives effort at Claris has enabled a harmonious balance amongst the organization, business, people and nature. It has helped in enriching the quality of work live through a clean, green and hygienic environment. It further aids in ensuring a feel of space and tranquility by optimizing people's movement and visibility by using systems, processes, and interventions to help create a world class work environment.

No one can deny the fact that cogeneration systems have become the need of the hour. With the energy crisis faced by country & ever increasing energy demand such systems would help reduce energy costs, increase overall plant efficiency and reduce carbon dioxide emissions thereby supporting sustainable development initiatives. Further, the system collects carbon credits which can be traded to earn revenue. A biogas generation system results not only in efficient solid waste management but also in renewable energy generation and control over methane emissions to the atmosphere as well as a significant reduction in waste disposal expenses. An efficient effluent treatment plant helps reduce the potential for pollution of receiving waters and to comply with discharge consent conditions. Effective management and control of the processes used for effluent treatment would help to reduce the operating costs and thus increase profits, achieve more effective compliance with legislation and improve company's public image. Natural lighting has been credited for improvements in productivity, a decrease in accidents, an increased level of mental performance, and a significant increase in energy savings. Additively stress reduction and attentional focus can also be increased by the presence of natural vegetation in the workspace or through transparent windows. Eco-efficiency generates more value through technology and process changes whilst reducing resource use and environmental impact throughout the product or service's life. Approaches to cleaner production by targeting waste/pollution/emission are still evolving but the success of these approaches require an international protocol on cleaner production, establishing standardized benchmarks for cleaner production, providing greater support to meet the specific needs of small and medium-sized enterprises, linking with financial sector to foster cleaner production, ensuring a balance of attention to sustainable consumption as well as production issues and facilitating greater access to cleaner production information.

Inspired by this philosophy and initial outcomes of approach to sustainable development, Claris endeavors to integrate sustainability in all diverse businesses through creation of integrated successful models based on green initiatives and look forward to achieve higher degree of sustainability.

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